8. Capital Budgeting

8.1 Meaning of Capital Budgeting (Nature of Investment)

Capital Budgeting are the decisions relating to proposed long term capital outlays. It is a formal process undertaken by the firm to efficiently invest funds in long term activities in anticipation of expected flow of future benefits over several years. The capital budgeting decisions have enormous impact on basic character of the firm on a long-term basis. The decisions normally involve substantial outlays and are generally irreversible without incurring substantial losses. Since benefits are likely to accrue to the firm in the future, there is an underlying uncertainty attached to the proposals.

> *"Capital Budgeting refers to the process of generating, evaluating, selecting and following up of capital expenditures alternatives.*

The basic features or nature of capital budgeting decisions are :

Long-term Effects : capital budgeting decisions determine the future destiny of the firm.

High Degree of Risk : Long-term investment of funds is exposed to different types of risks.

Huge Funds : Capital expenditure decisions require large amount of funds for acquisition of fixed assets or for implementing certain big projects.

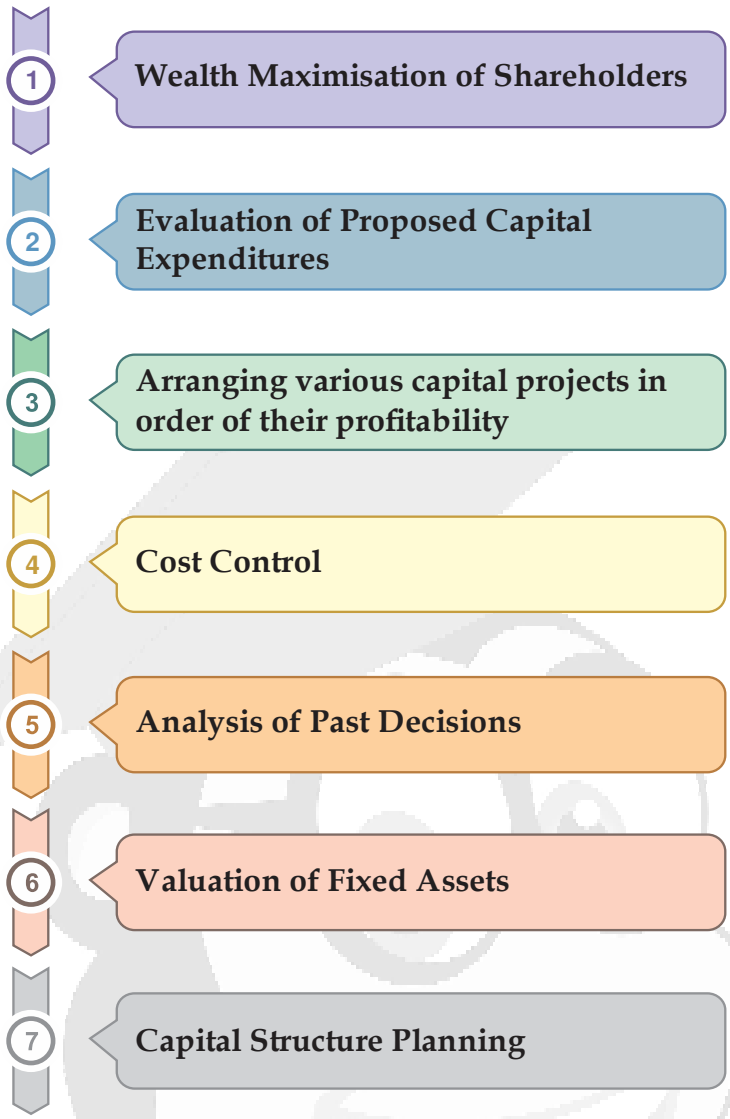
Irreversible Decisions : Capital budgeting decisions are irreversible and the amount invested cannot be realised back.

Most Difficult Decisions : Capital budgeting decisions are very difficult to make as their assessment depends on the uncertainty of future events and activities of the firm.

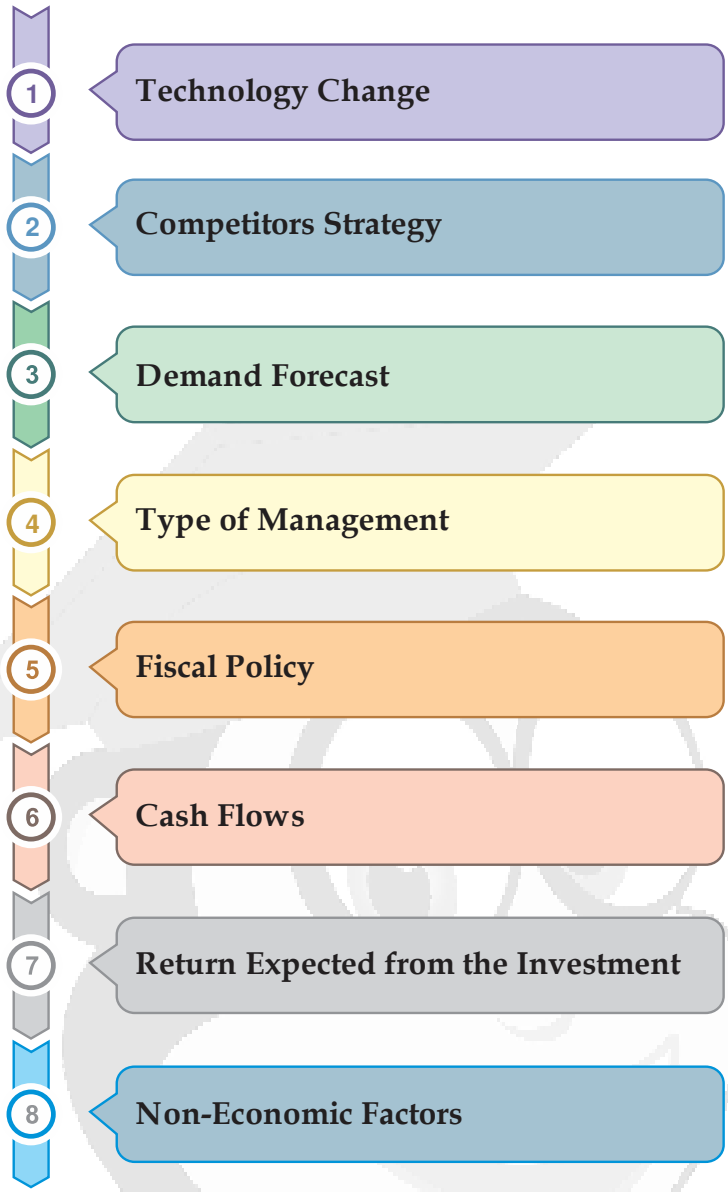
Impact on Firm's Competitive Strength : The capital budgeting decisions affect the capacity and strength of a firm to face the competition.

Impact on Cost structure : As a result of capital expenditure decisions, a firm commits itself to a sizable amount of fixed costs such a supervision charges, insurance, rent of premises, interest and so on.

Objectives of Capital Budgeting



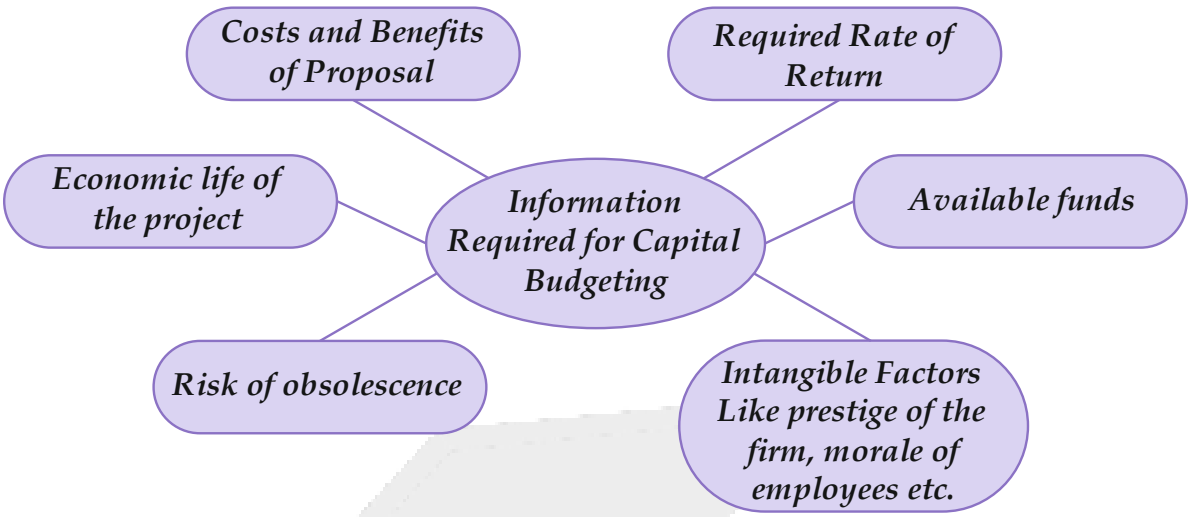
Factors Affecting Capital Budgeting Decisions



The Process of Capital Budgeting

1. **Project Generation:** In the first step, projects for investments are identified. This project may be undertaken to increase revenue or to reducing cost. For this, proposals for expanding production capacity, proposals for replacement of plant etc. could be undertaken.
2. **Project Evaluation:** In this step, costs and benefits from such projects are evaluated. Projects are judged on the basis of profitability and returns it offers to the firm.
3. **Project Selection:** The projects generated and evaluated are then screened at various levels of management. After screening, the top management may decide whether to select or reject the proposal.
4. **Project Execution:** A project is executed after final selection is made by the management. Required funds are allocated to execute the project.
5. **Performance Review:** Executed projects are then reviewed. Actual performance of the project is compared with the expected performance and deviations are found out. With the help of this future decisions are taken.

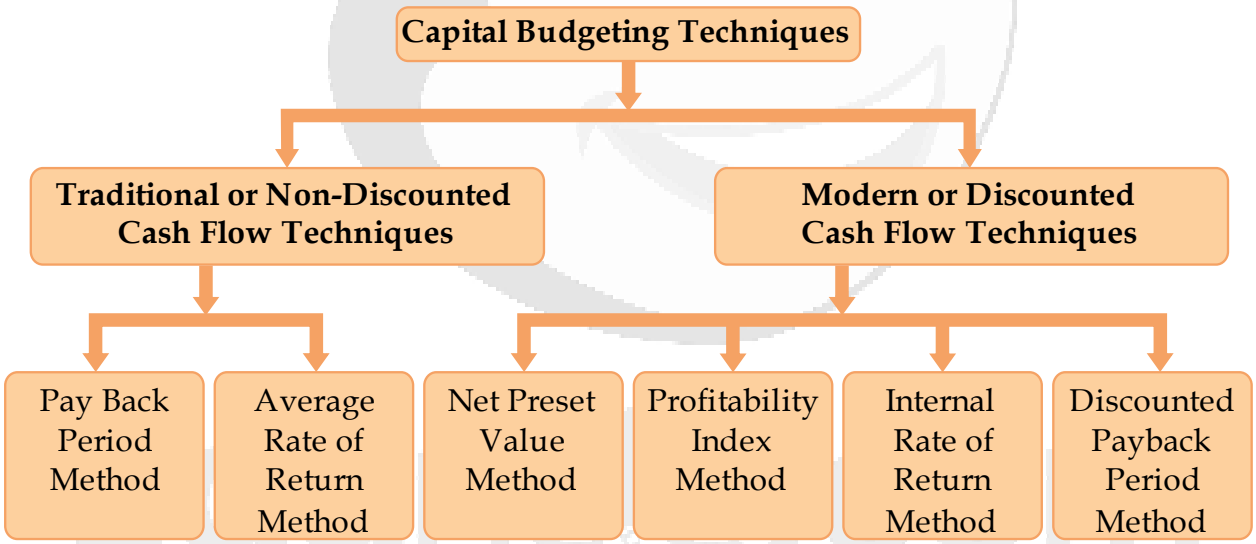
Information Required for Capital Budgeting



8.2 Capital Budgeting Techniques

Before accepting or rejecting the capital expenditure proposals, the profitability of these proposals should be taken into consideration. For evaluation of capital expenditure decisions any method may be used on the basis of which the difference between acceptable and non-acceptable proposals, selection of one or more alternatives and deciding of their order of priority and giving importance to more profits in comparison of less profits and giving priority to quick profits than future profits should be possible .

There are several techniques or methods used for the evaluation of capital expenditure decisions, which can be grouped into two categories as shown below:



(I) Traditional or Non-Discounted Cash Flow Techniques : *The traditional capital investment evaluation criteria are also known as 'unadjusted time methods' as they do not consider the present value of cash inflows.* It consists of the payback period and accounting rate of return methods.

1. Payback Period : It is one of the most popular and widely recognized traditional method. *This method gives importance to the recovery of original investment in the shortest period.* It is calculated by dividing the initial investment by the after-tax cash inflows relating to the cost of the project.

> *Payback Period is the number of years that a firm takes to recover its original investment in the project.*

If the cash inflows are even (such as for investments in annuities), the formula to calculate payback period is:

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Net Cash Flow per Period}}$$

When cash inflows are uneven, the pay-back period is calculated by the process of cumulating the cash inflows till the time cumulative cash inflows become equal to the initial investment outlay.

For example an investment of Rs. 10,000 in a project generates cash inflows of Rs. 2,000, Rs. 4,000 and Rs. 12,000 in first, second and third year respectively. By cumulating these cash inflows, the cumulative cash inflows at the end of second and third year comes to Rs. 6,000 and Rs/ 18,000. Hence, the pay-back period will be in between second and third year. Assuming that the cash inflows occur at an even rate during the year, the time required to recover the balance amount of additional Rs. 4,000 (Rs. 10,000 - 6,000) after recovery Rs. 6,000 till the end of second year, will be (Rs. 4,000/Rs. 12,000 × 12) 4 months. Thus, pay-back period come to 2 years plus 4 months.

Illustration : Even Cash Flows

Company C is planning to undertake a project requiring initial investment of $105 million. The project is expected to generate $25 million per year in net cash flows for 7 years. Calculate the payback period of the project.

Solution :

Payback Period

= Initial Investment ÷ Annual Cash Flow

= $105M ÷ $25M

= 4.2 years

Illustration : Andman Limited is considering whether to purchase some special machines. Management does not wish to buy the machines unless their cost can be recovered in three years. The following information is available :

(1) Cost of the machines Rs. 3,00,000;

(2) Sales revenue generated by the new machines is Rs. 4,00,000;

(3) Variable cost is 60% of sales;

(4) Annual fixed costs other than depreciation are Rs. 15,000;

(5) Life of the machines is 8 years and tax rate is 50%.

Based on the criterion of three year's recovery period, should the special machines be purchased? Support your answer with a computation of pay-back period required for the investment of Rs. 3,00,000 to be recovered.

Solution : Profitability Statement

	Rs.	Rs.
Sales Revenue		400,000
Less : Variable Cost (60% of sales)	240,000	
Fixed Costs	15,000	255,000
		145,000
Less : Depreciation (3,00,000 ÷ 8)		37,500
Profit Before Tax		107,500
Less : Income Tax @ 50%		53,750
Profit After Tax		53,750
Add : Depreciation		37,500
Net Cash Inflows		91,250

$$\text{Pay} - \text{Back Period} = \frac{I}{C}$$

or $$\frac{\text{Initial Investment}}{\text{Annual Net Cash Inflows}}$$

$$= \frac{\text{Rs. } 3,00,000}{\text{Rs. } 91,250} = 3.3 \text{ years}$$

Decision : Therefore, it is clear that machine should be purchase, because cost can not be realised in 3 years.

Illustration : Uneven Cash Flows

Company C is planning to undertake another project requiring initial investment of $50 million and is expected to generate $10 million net cash flow in Year 1, $13 million in Year 2, $16 million in year 3, $19 million in Year 4 and $22 million in Year 5. Calculate the payback value of the project.

Solution :

Year	(Cash Flows in millions)	
	Annual Cash Flow	Cumulative Cash Flow
0	–50	–50
1	10	–40
2	13	–27
3	16	**–11**
4	**19**	8
5	22	30

Payback Period = 3 + 11/19 = 3 + 0.58 = 3.58 or 3.6 years

Illustration : A Limited Company is considering investing in a project requiring a capital outlay of Rs. 1,00,000. Forecasts of *annual income after depreciation but before tax is as follows:*

Year	1	2	3	4	5
Amount (Rs.)	50,000	50,000	40,000	40,000	20,000

Depreciation may be taken at 20% on original cost and income tax at 50% of net income. Evaluate the project using pay-back method.

Solution : Statement of Net Cash Inflows

Year	Profit after Depreciation but before tax	Tax @ 50%	Depreciation Inflows	Net Cash	Cummulative Cash Inflows
	A Rs.	B Rs.	C Rs.	(A – B + C) Rs.	Rs.
1	50,000	25,000	20,000	45,000	45,000
2	50,000	25,000	20,000	45,000	90,000
3	40,000	20,000	20,000	40,000	130,000
4	40,000	20,000	20,000	40,000	170,000
5	20,000	10,000	20,000	30,000	200,000

Annual Depreciation = Rs. 1,00,000 × $\frac{20}{100}$ = Rs. 20,000

Pay-back Period = $2 + \frac{\text{Rs. } 1,00,000 - \text{Rs. } 90,000}{\text{Rs. } 40,000}$

$= 2 + \frac{10,000}{40,000}$

$= 2\frac{1}{4}$ years i.e. 2 years 3 months.

Illustration : India Sweets is considering the purchase of a machine. Two machines are available in the market, A and B, each costing Rs. 1,00,000. Earnings after tax but before depreciation are expected to be as follows :

Year	1	2	3	4	5
Cash Inflows :	Rs.	Rs.	Rs.	Rs.	Rs.
Machine A	25,000	37,500	50,000	25,000	12,500
Machine B	12,500	37,500	50,000	37,500	25,000

Evaluate the two alternatives according to Pay-back Method.

Solution : Calculation of Pay-back Period

Year	Machine A (Rs. 1,00,000)		Machine B (Rs. 1,00,000)	
	Net Cash Inflows	Cummulative Cash Inflows	Net Cash Inflows	Commulative Cash Inflows
	Rs.	Rs.	Rs.	Rs.
1	25,000	25,000	12,500	12,500
2	37,500	62,500	37,500	50,000
3	50,000	112,500	50,000	100,000
4	25,000	137,500	37,500	137,500
5	12,500	150,000	25,000	162,500

Pay-back Period $= 2 + \frac{\text{Rs. } 1,00,000 - \text{Rs. } 62,500}{\text{Rs. } 50,000}$ $= 2 + \frac{\text{Rs. } 1,00,000 - \text{Rs. } 50,000}{\text{Rs. } 50,000}$

$= 2 + \frac{3}{4} = 2.75$ Years $= 2 + 1 = 3$ Years

Decision : Under pay-back period, machine A will be selected.

> ***Decision Criterion in Pay-Back Period Method:*** *Payback period method is used for accepting or rejecting a project or projects:*
> *(i) A project is accepted if it's payback period is less than maximum payback period decided by the top management.*
> *(ii) A ranking of a number of projects is done keeping the project of least payback period on first rank and so on.*
> *(iii) If the management has to choose one project between two mutually exclusive the project with shortest payback period will be chosen.*

Merits of Pay-Back Period Method

1. It is a simple method to use.
2. **Important method for cash shortage firms:** This method is quite important for those firms which are facing problems of cash shortage and finance their projects through loans. Those firm usually prefer projects of smaller payback period.
3. **Risk of obsolescence:** Such projects in which the technological development is quite fast and there is more risk of obsolescence, then such projects are chosen in which payback period is small.
4. **More accurate estimates:** In this method, we do not consider entire life of the project but only the period of payback is taken into consideration. Therefore, estimates are more real and accurate.

Demerits of Pay-Back Period

1. **More Importance to Pay Back of Invested Funds :** there is more importance given to liquidity rather than to the profitability which is not right.
2. **Does not Consider the Income Received After Payback Period :** In this method only the payback of the original investment is considered. The objective of any business firm to invest money in capital projects is not only to get the investment back but also to earn profit, therefore, earnings in the entire life of the project should be considered.
3. **Ignores Cost of Capital :** The cost of capital is the strong basis for investment decisions but pay-back method ignores cost of capital.
4. **Does not Consider the Time Factor :** This method does not consider the time factor of cash inflows. It is important to know the present value of future cash inflows from different projects to make them comparable, therefore this ignores the time value of money.
5. **Does not Measure Risks :** This method does not measure risks in the project. If a project has shorter payback period but more risk, it can also be accepted which is not good.
6. **More Emphasis on Cash Inflows of Initial Years :** There is more emphasis on cash inflows of initial years and no importance is given to income received in later years. If in a project the initial income or cash inflow is quite high, then that project is accepted and a project with very high income in later years is not accepted, this is not good.

2. Accounting Rate of Return (ARR) : The ARR is the ratio of profit (net of accounting depreciation) to capital invested. Accounting rate of return is calculated by dividing the average income after taxes by the initial or average investment is represented by the formula :

Focus Formula

- If profit after tax and depreciation are given-

$$ARR = \frac{\text{Average Annual Income after tax and depreciation}}{\text{Average Investment}} \times 100$$

- If annual cash inflows are given-

$$ARR = \frac{\text{Average Annual Cash Inflows} - \text{Annual Depreciation}}{\text{Average Investment}} \times 100$$

- If value of original investment is used-

$$ARR = \frac{\text{Average Annual Income after tax and depreciation}}{\text{Original Investment}} \times 100$$

In case of ***replacement projects***, the average rate of return is calculated by dividing the increase in expected future annual net earnings due to installation of new machine in place of old machine by total or average incremental investment. Symbolically.

Note : Average Investment = $\frac{1}{2}$ (Initial Investment – Salvage Value) + Salvage Value

or $= \frac{1}{2}$ (Initial Investment + Salvage Value)

Now, the ***formula for Average Rate of Return*** may be written as-

$$ARR = \frac{\text{Average Annual Income after tax and depreciation}}{\frac{1}{2}(\text{Initial Investment} + \text{Salvage value})} \times 100$$

Illustration : A project costs Rs. 15,000 and has a scrap value of Rs. 3,000. Its stream of income before depreciation and taxes during first five years is Rs. 3,000; Rs. 3,600; Rs. 4,200; Rs. 4,800 and Rs. 6,000. Assuming tax rate at 50% and depreciation on straight line basis, calculate the average rate of return for the project.

Solution : Calculation of Average Rate of Return

Year	1	2	3	4	5	Total	Average
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Income before Depreciation and Taxes	3,000	3,600	4,200	4,800	6,000	21,600	4,320
Less : Depreciation	2,400	2,400	2,400	2,400	2,400	12,000	2,400
Net Income before taxes	600	1,200	1,800	2,400	3,600	9,600	1,920
Less : Income taxes @ 50%	300	600	900	1,200	1,800	4,800	960
Net Income After taxes	300	600	900	1,200	1,800	4,800	960
Book Value of Investment :							
Beginning	15,000	12,600	10,200	7,800	5,400	51,000	10,200
Ending	12,600	10,200	7,800	5,400	3,000	39,000	7,800
Average	13,800	11,400	9,000	6,600	4,200	45,000	9,000

$$ARR = \frac{\text{Average Annual Income after tax and depreciation}}{\text{Average Investment}} \times 100$$

$$= \frac{\text{Rs. } 960}{\text{Rs. } 9,000} \times 100 = 10.675$$

or $$ARR = \frac{\text{Average Annual Income}}{\frac{1}{2}(\text{Initial Investment} + \text{Scrap Value})} \times 100$$

$$= \frac{\text{Rs. } 960}{\frac{1}{2}(\text{Rs. } 15,000 + 3,000)} \times 100$$

$$= \frac{\text{Rs. } 960}{\text{Rs. } 9,000} \times 100 = 10.67\%$$

Illustration : ABC Ltd. is considering investing in a project that costs Rs. 5,00,000. The estimated salvage value is zero; tax rate is 35 per cent. The company uses straight line depreciation for tax purposes and the proposed project has cash flows before depreciation and tax (CFBDT) as follows :

Year	1	2	3	4	5
CFBDT (Rs.)	1,00,000	1,00,000	1,50,000	1,50,000	2,50,000

Determine the following} (i) Pay back period, and (ii) Average rate of return.

Solution : Cash Inflows

Year	**1**	**2**	**3**	**4**	**5**
	Rs.	Rs.	Rs.	Rs.	Rs.
Cash Flow before dep. And tax	1,00,000	1,00,000	1,50,000	1,50,000	2,50,000
Less : Depreciation	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Profit before tax	–	–	50,000	50,000	1,50,000
Less : Tax @ 35%	–	–	17,500	17,500	52,500
Profit After tax	–	–	32,500	32,500	97,500
Add : Depreciation	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Cash Inflow	1,00,000	1,00,000	1,32,500	1,32,500	1,97,500
Cummulative CF	1,00,000	2,00,000	3,32,500	4,65,000	6,62,500

(i) $$\text{Pay-back Period} = 4 + \frac{\text{Rs. } 5,00,000 - \text{Rs. } 4,65,000}{\text{Rs. } 1,97,500}$$

$$= 4 + 0.18 = 4.18 \text{ Years}$$

(ii) $$ARR = \frac{\text{Average Annual Income after tax and depreciaton}}{\text{Average Investment}} \times 100$$

$$= \frac{\text{Rs. } 1,62,500 / 5}{\text{Rs. } 5,00,000 / 2} \times 100$$

$$= \frac{\text{Rs. } 32,500}{\text{Rs. } 2,50,000} \times 100 = 13\%$$

In this method the estimated net annual income is calculated. This average income is not based on annual cash inflow; but is based on accounting theory. This net income is after tax and depreciation and it is average net annual income. So, the estimated total income after depreciation and tax received during the entire life of the project is divided by the life of the project which gives the average annual net income. If net annual cash flow is given in the projects, then the average annual net income is obtained by deducting annual depreciation from annual cash inflow.

Decision Criterion in ARR Method

The management of every firm fixes a minimum acceptance rate based on various internal and external factors.

(i) A project is accepted if calculated average rate of return (ARR) is equal or more than the fixed rate of return.

(ii) A project is rejected if ARR is less than the fixed rate of return.

(iii) In case of alternative projects, ranking is done as per the basis of ARR of each project. The project with highest ARR will be selected.

Merits of Average Rate of Return Method

1. **Simple :** The ARR method is simple to understand and use.
2. **Considers Whole Life of the Project :** This method considers the income during whole life of the project.
3. **Test of Profitability:** In this method profitability of different projects is evaluated, so comparison of different projects is possible.
4. **Considers Net Income After Depreciation:** In this method the net income after depreciation is used therefore it is theoretically very sound.
5. **More Useful for Analysis of Long-Term Projects:** This method is quite useful for the analysis of long-term projects because it considers the whole life of the project.
6. **Best Use of Wealth:** This method can be used by businessman for the investment of his wealth in the most profitable sector.

Demerits of Average Rate of Return Method

1. **Does not Consider Time Value of Money:** This method does not consider time value of money. The comparative study is essential for the evaluation of different projects and for this purpose the calculation of present value of cash inflows of different projects is necessary. But this is not done in this method.
2. **Considers Accounting Profits and not Cash Flows:** In this method the accounting profits and not cash flows are considered in appraising projects.
3. **It is Difficult to Determine the Fair Rate on Investment:** It is quite difficult to find out in this method whether the rate of return earned on investment is fair or not. Generally, the minimum rate of return on the investment is decided by the top management. The projects having less than this rate of are not considered.
4. **Concepts of Investment and Income are Vague:** In this method, the income and investment words are used which have not got any meanings. So, there is uncertainty and vagueness.

(II) Modern or Discounted Cash Flow Methods: These methods were developed because of the numerous shortcomings of traditional approaches. They consist of the net present value, internal rate of return, and the profitability index methods and discounted payback method.

Funds in hand today can be invested in profitable projects and thereby yield additional funds to the investing company. Funds to be received at some future date cannot be profitably invested until that time and so have no earning power in the interim. For the reason, a business concern must place a time value on its money which states that "a rupee in hand today is much more valuable than one to be received in future time." The discounted cash flow method simply applies the general concept to the analysis of new capital investments. If in any business, 10 % return is obtained than today's invested Rs.100 will become Rs.110 after one year, Rs.121 after two years and Rs.133.1 after three years.

The present value of any amount received in future after a definite period can be calculated by following mathematical formula or with the help of present value tables:

Focus Formula

$$PV = \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} + ... \frac{C_n}{(1+r)^n}$$

When PV = Present value of future cash inflows
C = Cash Inflow,
n = Number of Years,
r = Rate of Interest

1. Net Present Value Method: This method is used in the appraisal of capital investment proposal. It is the present value of the project's net cash flows discounted at the company's cost of capital to the time of the initial capital outlay, minus that outlay.

> *"Net present value is defined as the aggregate of present value of expected inflows minus the total present value of outflows; where the inflows and outflows are discounted for timing a rate of discount equivalent to the cost of capital of the firm.*

Symbolically

Focus Formula

$$NPV = \left(\frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} ..... \frac{C_n}{(1+r)^n} \right) - I$$

where NPV = Net Present Value;
C_1, C_2, C_n = Cash inflows for n years;
I = Initial Investment
r = Discount factor or interest rate ;
n = Number of years.

Decision Criterion in NPV Method

(i) If the present value of the project is positive or zero, then the proposal is accepted. If NPV is negative than the project is rejected.

(ii) When management must choose only one project out of available many mutually exclusive projects, then the project with highest positive NPV is given top priority.

There are four components to assess when conducting an investment appraisal using the NPV method; the initial cash outflow or investment cost; the net cash inflows the lifespan of the project and the cost of the capital

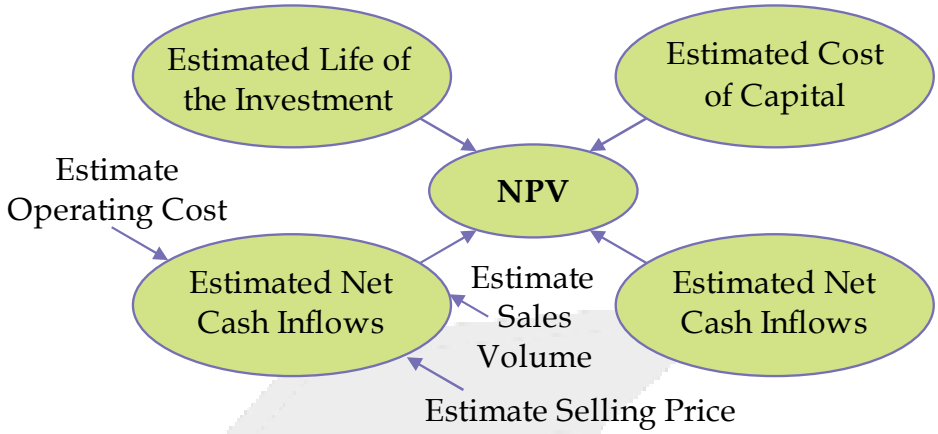


Illustration : Final out the Net Present Value for which a project requires an initial investment of Rs. 25,000 and involves a net cash inflow of Rs. 12,000 each for 3 years. The cost of funds is 8% There is no scrap value.

The present value of an annuity of Re 1 for 3 years at 8% per annum is Rs. 2.577.

Solution : Calculation of Net Present Value

(i) With the help of formula :

$$NPV = \left(\frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} \right) - I$$

$$= \left(\frac{Rs.12,000}{(1+0.08)} + \frac{Rs.12,000}{(1+0.08)^2} + \frac{Rs.12,000}{(1+0.08)^3} \right) - Rs.25,000$$

= Rs. 11,112 + Rs. 10,284 + Rs. 9,528 - Rs. 25,000

= Rs. 30,924 - Rs. 25,000 = Rs. 5,924

(ii) With the help of Present Value Tables

Year	Cash Inflows	P.V. Factor at 8%	Present Value
	Rs.		Rs.
1	12,000	0.926	11,112
2	12,000	0.857	10,284
3	12,000	0.794	9,528
	Total Present Value		**30,924**

Net Present Value = Total Present Value - Initial Outlay

= Rs. 30,924 - 25,000 = Rs. 5,924

With the help of Cumulative Present Value Table (Annuity of Re. 1)	**Rs.**
Present value of cash inflows (12,000 × 2.577)	30,924
Less : Initial Cash outlay	25,000
Net Present Value or NPV	5,924

Illustration : (Non-conventional Cashflows) : No project is acceptable unless the yield is 10%. Cash inflows inflows of a certain project along with cash outflows are given below :

Year	0	1	2	3	4	5
Outflows (Rs.)	150,000	30,000	–	–	–	–
Inflows (Rs.)	–	20,000	30,000	60,000	80,000	30,000

The salvage value at the end of the 5th year is Rs. 40,000. Calculate net present value.

The present value of Re. 1 for five years at 10% discount factor is .909, .826, .751, .683 and .621 respectively.

Solution : Calculation of Present Value of Cash Outflows

Year	Outflows	P.V. factor at 10%	Present Value
	Rs.		Rs.
0	150,000	1	150,000
1	30,000	0.909	27,270
			177,270

Calculation of Present Value of Cash Inflows

Year	Outflows	P.V. factor at 10%	Present Value
	Rs.		Rs.
1	20,000	.909	18,180
2	30,000	.826	24,780
3	60,000	.751	45,060
4	80,000	.683	54,640
5	30,000	.621	18,630
5 (Salvage)	40,000	.621	24,840
			186,130

Net Present Value = Total Present Value – Initial Investment

= Rs. 1,86,130 – Rs. 1,77,270

= Rs. 8,860

Illustration : Machine 'A' costs Rs. 1,00,000 payable immediately. Machine 'B' costs Rs. 1,20,000 half payable immediately and half payable in one year's time. The cash receipts expected are as follows

Year (at end)	Machine A	Machine B	Discount Factor at 7%
	Rs.	**Rs.**	
1	20,000	–	.935
2	60,000	60,000	.873
3	40,000	60,000	.816
4	30,000	80,000	.763
5	20,000	–	.713

At 7% opportunity cost, which machine should be selected on the basis of NPV?

Solution :

(i) Calculation of Present Value of Cash Outflows

Year	Investment		P.V. Factor at 7%	Present Value	
	Machine A	Machine B		Machine A	Machine B
	Rs.	Rs.		Rs.	Rs.
0	100,000	60,000	1.000	100,000	60,000
1	–	60,000	0.935	–	56,100
				100,000	**116,100**

Net Present Value = P.V. of Cash Inflows - P.V. of Cash Outflows

Machine A = Rs. 1,40,870 - Rs. 1,00,000 = Rs. 40,870

Machine B = Rs. 1,62,380 - Rs. 1,16,100 = Rs. 46,280

(ii) Calculate of Net Present Value

Year	Investment		P.V. Factor at 7%	Present Value	
	Machine A	Machine B		Machine A	Machine B
	Rs.	Rs.		Rs.	Rs.
1	20,000	–	.935	18,700	–
2	60,000	60,000	.873	52,380	52,380
3	40,000	60,000	.816	32,640	48,960
4	30,000	80,000	.763	22,890	61,040
5	20,000	–	.713	14,260	–
	Total Present Value			**140,870**	**162,380**

Decision : Machine B is having higher NPV and may be selected.

Merits of NPV Method

(a) Whole life of the project is considered in this method.

(b) Time Value of Money is considered.

(c) Focus on Maximization of shareholders' wealth.

(d) Comparison of Relative Profitability between different projects.

Demerits of NPV Method:

(a) Difficult to Understand.

(b) Determination of Discount Rate of Capital is Difficult

(c) Unsuitable for Projects having different Costs.

(d) Unsuitable for projects of different Economic Life.

2. Internal Rate of Return (IRR) : It refers to the rate of return which is internal to a given project for discounting various cash inflows accruing from a given project in such a way that the time value of cash inflows at the internal rate of return will be equal to the initial investment.

> *IRR is that rate of return at which present value of cash inflows is equal to present value of cash outflows.*

This rate is called internal rate because it exclusively depends on the initial outlay and cash proceeds associated with the project and may not be any other rate outside the investment. The value of internal rate of return in the case of given projects can be determined by using the following formula :

Focus Formula

$$\left(\frac{C_1}{(1+r)}+\frac{C_2}{(1+r)^2}+.....\frac{C_n}{(1+r)^n}-I=0\right)$$

where I = *Initial Investment;*
C_1, C_2, C_n = *Net Cash inflows in 1, 2, 3….. n years;*
r = *Internal rate of return or discount rate*

Steps for computation of Internal Rate of Return:

Even Cash Inflows:

Step 1 : ***First all of a rough approximation may be made with reference to present value factor (P.V. factor) or pay-back period.*** This can be done by dividing the cost of initial investment by annual cash inflows. Symbolically,

$$\text{P.V. Factor} = \frac{\text{Initial Investment}}{\text{Annual Cash Inflows}} \quad \text{Or} \quad \frac{I}{C}$$

Step 2 : In order to make a precise estimation of the IRR, ***find out the present values (P.V.) of the project for both these rates as follows :***

Present Value = Annual Cash Inflows × P.V. Factor for an Annuity

Example : P.V. at 15% = Rs. 3,000 × 3.352 = Rs. 10,056

P.V. at 16% = Rs. 3,000 × 3.274 = Rs. 9,822

Step 3 : ***Find out the exact IRR between the two rates by interpolation*** i.e. 15% and 16%. The following formula may be used for interpolation.

Focus Formula

$$IRR = LDR + \frac{P_1 - Q}{P_1 - P_2} \times (HDR - LDR)$$

where; LDR = *Lower Discount Rate*
P_1 = *Present values at lower rate of interest*
P_2 = *Present values at higher rate of interest*
Q = *Net Cash Outlay*
HDR = *Higher Discount Rate*

Illustration : A project costs an initial investment of Rs. 40,000 and is expected to generate annual cash inflows of Rs. 16,000 for 4 years. Calculate internal rate of return (IRR).

Present Value of Re. 1 at varying discount rates for a period of 4 years.

Years	19%	20%	22%
1	0.8403	0.8333	0.8196
2	0.7062	0.6944	0.6719
3	0.5934	0.5787	0.5507
4	0.4987	0.4823	0.4514
Total	2.6386	2.5887	2.4936

Solution :

$$\text{P.V. Factor} = \frac{I}{C} = \frac{40,000}{16,000} = 2.5$$

The p.v. factor of 2.5 at different interest rates lies between 2.4936 and 2.5887, the cumulative present value of Re. 1 for 4 years. Hence, the IRR of the project is expected to lie between 20% and 22%.

P.V. of Cash Inflows at 20% = 16,000 × 2.5887 = Rs. 41,419

P.V. of Cash Inflows at 22% = 16,000 × 2.4936 = Rs. 39,898

By Interpolation :

$$IRR = LDR + \frac{P_1 - O}{P_1 - P_2} \times (HDR - LDR)$$

where; LDR = Lower Discount Rate

P_1 = Present values at lower rate of interest

P_2 = Present values at higher rate of interest

O = Initial Investment

HDR = Higher Discount Rate

Substituting the values,

$$IRR = 20 + \frac{\text{Rs. } 41,419 - 40,000}{\text{Rs. } 41,419 - 39,898} \times (22 - 20)$$

$$= 20 + \frac{1,419}{1,521} \times 2$$

$$= 20 + \frac{2,838}{1,521}$$

$$= 20 + 1.866 = 21.866\%$$

Un-Even Cash Inflows

IRR is calculated by ***'Trial and Error Method'***, In this method, present values of cash inflows are computed at different rates of interest. It requires the following steps :

1. Establishing the First Trial Rate : At which rate trial should be commenced is comparatively difficult to decide. But, if net cash inflows are not too uneven*, then P.V. factor based on average of the annual cash inflows may be used as first trial rate which can be calculated as follows :

$$\boxed{\text{P.V. Factor} = \frac{\text{Initial Investment}}{\text{Average Annual Cash Inflows}}}$$

2. The Second Trial Rate : The total of the present value of cash inflows calculated by first trial rate during the economic life of the project will be compared with the cost of the project. ***If the total present value is more than the cost of the project the second trial rate will be higher than the first trial rate*** and the present value of cash inflows will be calculated at this rate. On the contrary, ***if the total present value of cash inflows is less than the cost of the project, the second trial rate will be lower than the first trial rate*** and the present value of cash inflows will be calculated at this rate.

3. Computation of Actual IRR : The actual discount rate lies between the first and second trial rate and the same can be ascertained with the help of simple interpolation. The formula of interpolation is given earlier (in case of even cash inflows).

Illustration : A project with an initial investment of Rs. 10,000 generates cash inflows of Rs. 5,000; Rs, 4,000 and Rs, 3,000 with life of 3 years. What will be the internal rate of return?

Solution :

Step I : For this, first trial rate will be calculated as follows :

$$\text{P.V. Factor} = \frac{\text{Initial Investment}}{\text{Average Annual Cash Inflows}}$$

$$= \frac{\text{Rs. } 10,000}{\frac{\text{Rs. } 5,000 + \text{Rs. } 4,000 + \text{Rs. } 3,000}{3}}$$

$$= \frac{\text{Rs. } 10,000}{\text{Rs. } 4,000} = 2.5$$

In the row of 3rd year of the cumulative present value table, the rate of return at this P.V. Factor is approximately 10%. Therefore, total present value of cash inflows of different years at this rate will be compared with the cost of the investment :

Verification of First Trial Rate of Return

Year	Cash Inflows	P.V. Factor at 10%	Present Value
	Rs.		Rs.
1	5,000	0.909	4,545
2	4,000	0.826	3,304
3	3,000	0.751	2,253
			10,102

Step II : As the total present value of cash inflows (Rs. 10,102) is more than the cost of investment (Rs, 10,000); hence, the next trial rate will be higher than this i.e. 12% and total present value at this rate will be as follows :

Verification of Second Trial Rate of Return

Year	Cash Inflows	P.V. Factor at 12%	Present Value
	Rs.		Rs.
1	5,000	0.893	4,465
2	4,000	0.797	3,188
3	3,000	0.712	2,136
			9,789

Step III : At this rate (12%) the total present value of cash inflows (Rs. 9,789) is less than the cost of investment (Rs. 10,000), therefore, the IRR will be lower than this. The actual IRR will be calculated by interpolation as follows :

$$\text{IRR} = \text{LDR} + \frac{P_1 - Q}{P_1 - P_2} \times (\text{HDR} - \text{LDR})$$

$$= 10 + \frac{\text{Rs. } 10,102 - 10,000}{\text{Rs. } 10,102 - 9,789} \times (12 - 10)$$

$$= 10 + \frac{102}{313} \times 2$$

$$= 10 + \frac{204}{313}$$

$$= 10 + 0.65 = 10.65\%$$

Illustration : Pick up Limited desires to purchase a new machine in order to increase its present level of production. The cost of machine will be Rs. 70,000 and the net cash inflows during its life will be as follows :

Year	1	2	3	4	5
Net Cash Flows (Rs.)	50,000	40,000	20,000	10,000	10,000

Minimum rate of return laid down by the management is 25% p.a. Is the investment desirable ?

Discuss it according to Internal Rate of Return.

Discount Factor

Year	**1**	**2**	**3**	**4**	**5**
35%	0.741	0.549	0.406	0.301	0.223
40%	0.714	0.510	0.364	0.260	0.186

Solution : Verification of First Trial of Return

Year	**Cash Inflows**	**P.V. Factor at 35%**	**Present Value**
	Rs.		Rs.
1	50,000	0.741	37,050
2	40,000	0.549	21,960
3	20,000	0.406	8,120
4	10,000	0.301	3,010
5	10,000	0.223	2,230
			72,370

The present value of cash inflows (Rs. 72,370) at 35% discount factor is more than the cost of investment (Rs. 70,000), hence next trial will be at higher rate i.e., at 40% at which the present values would be is as under :

Verification of Second Trial Rate of Return

Year	**Cash Inflows**	**P.V. Factor at 40%**	**Present Value**
	Rs.		Rs.
1	50,000	0.714	35,700
2	40,000	0.510	20,400
3	20,000	0.364	7,280
4	10,000	0.260	2,600
5	10,000	0.186	1,860
			67,840

The present value of cash inflows at this rate (40%) of return is Rs. 67,840 which is less than the cost of investment (Rs. 70,000), hence the IRR will be less than 40%. The actual IRR lies between 35% and 40% which will be calculated by simple interpolation as under :

$$IRR = LDR + \frac{P_1 - Q}{P_1 - P_2} \times (HDR - LDR)$$

where; LDR = Lower Discount Rate

P_1 = Present values at lower rate of interest

P_2 = Present values at higher rate of interest

Q = Net Cash Outlay

HDR = Higher Discount Rate

Substituting the values,

$$IRR = 35 + \frac{Rs.72,370 - 70,000}{Rs.72,370 - 67,840} \times (40 - 35)$$

$$= 35 + \frac{2,370}{4,530} \times 5$$

$$= 35 + \frac{11,850}{4,530}$$

$$= 35 + 2.62 = 37.62\%$$

Decision Rule

A firm has to decide its own cut-off rate or the hurdle rate to make a decision on the basis of IRR method.

(i) A particular project is accepted if the IRR is more than the minimum required rate or cut-off rate, otherwise it is rejected.

(ii) In case of mutually exclusively projects, the top priority is given to the project with highest IRR.

Merits of IRR : The following are the merits of IRR method:

(i) In these methods the full life of the project is taken into consideration.

(ii) They consider the time factor i.e. the present value is calculated with an appropriate rate.

(iii) It is not based upon assumed cost of capital.

(iv) The comparative profitability and suitability of projects can be judged.

(v) It focus on maximization of shareholders wealth.

Demerits of IRR : The following are the demerits of IRR method:

(i) This method is quite difficult to use and understand.

(ii) It is quite difficult to calculate accurately the cash inflows in the whole life of the project.

(iii) The cost estimation of the project is quite difficult

(iv) The estimation of appropriate rate of discount is quite difficult.

(v) The method is based upon an assumption of reinvestment rate being the same as IRR of individual project.

Multiple Internal Rate of Return

In cases where project cash flows reverse during the life of a project for example, an initial cash outflow is followed by cash inflows and subsequently followed by a major cash outflow, there may be more than one IRR. In such situations if the cost of capital is less than the two IRRs, a decision can be made easily, however, otherwise the IRR decision rule may turn out to be decision misleading as the project should only be invested if the cost of capital is between IRR1 and IRR2. To understand the concept of multiple IRRs it is necessary to understand the implicit reinvestment assumption in both NPV and IRR techniques.

Modified Internal Rate of Return

One of the points advanced in favour of the IRR approach is that IRR is expressed as a percentage and decision makers may prefer to think in percentage terms. But IRR has also been criticized on the grounds that it is a percentage that contains the implicit assumptions that returns are invested at the rate equal to the IRR. There has been much discussion about this point. It may not be possible for a firm to reinvest intermediate cash flows at a rate of return equal to the project's IRR. The analysts favouring the use of IRR but concerned about the impact of the reinvestment debate have provided a modified device, also consistent with NPV, which circumvents any reinvestment worries. *This is called the modified internal rate of return (MIRR) or the terminal rate of return. Under this method, all cash flows apart from the initial investment, are brought to the terminal value using an appropriate discount rate (usually the cost of capital). This results in a single stream of cash inflow in a terminal year. The MIRR is obtained by assuming a single outflow in the zero year and the terminal cash inflow as mentioned above. The discount rate which equates the present value of the terminal cash inflow to zeroth year outflow is called the MIRR.*

3. Profitability Index (PI) or Present Value Index Method: The PI or benefit cost ratio (b/c ratio) or desirability factor is also one of the time adjusted factors of evaluating capital investing proposals. ***It is the ratio of the present value of cash inflows and outflows*** and is represented by the formula :

Profitability Index = (PV of future cash flows) ÷ Initial investment
Or
Net Profitability or NPVI = (Net Present Value) ÷ Initial Investment

PI is a conceptually sound method of appraising investment projects. It gives due consideration to the time value of money. Administratively, it requires more computation than the traditional method, but less than the IRR method.

Decision Rule

(i) ***The acceptance rule is to accept projects with PI greater than or equal to one and reject those with PI less than one.***

(ii) *Project can be ranked in accordance with their PI. Highest rank will be given to the project with the highest PI, while lowest rank is assigned to the project with the lowest PI.*

Illustration : The initial cash outlay of a project is Rs. 50,000 and it generates cash inflows of Rs. 20,000, Rs. 15,000, Rs. 25,000 and Rs. 10,000 in first four years. Using present value index method, appraise profitability of proposed investment assuming 10% rate of discount.

The present value of Re. 1 at 10% discount factor for four years is 0.909, 0.826, 0.751 and 0.683.

Solution : Calculation of Present Value and Profitability Index

Year	Cash Inflows	P.V. Factor at 10%	Present Value
	Rs.		Rs.
1	20,000	0.909	18,180
2	15,000	0.826	12,390
3	25,000	0.751	18,775
4	10,000	0.683	6,830
		Total	56,175

Net Present Value = Total Present Value - Initial Outlay

= Rs. 56,175 - Rs. 50,000 = Rs. 6,175

Profitability Index or PVI

$$= \frac{\text{Present Value of Cash Inflows}}{\text{Initial Cash Outflows}}$$

$$= \frac{\text{Rs. } 56,175}{\text{Rs. } 50,000} = 1.1235$$

As profitability index is more than 1, the proposal can be accepted.

Net Profitability Or NPVI

$$= \frac{\text{Net Present Value}}{\text{Initial Cash Outflows}}$$

$$= \frac{\text{Rs. } 6,175}{\text{Rs. } 50,000} = .1235$$

Or NPI = 1.1235 – 1 = 0.1235

As net profitability index is positive, the proposal may be accepted.

Illustration : The following (financially) mutually exclusive projects are considered :

	Project A	Project B
PV of Cash Inflows	Rs. 20,000	Rs. 8,000
Initial Cash Outlay	15,000	5,000
Net Present Value	5,000	3,000
Profitability Index	1.33	1.6

Which project should be preferred and why?

Solution : The Project A is having higher NPV of Rs. 5,000 and therefore, as per NPV method, it should be preferred. However as per Profitability Index Method, Project B should be selected as it is having higher PI of 1.6 against 1.33 of Project A.

Illustration : Find out the profitability index, given the following data, regarding plants A and B. Rank the projects on the basis of profitability index (discount ratio 15%).

Year	Cashflows (Rs.)	
	Plant A	Plant B
0	-20,000	-12,000
1	9,500	6,000
2	11,000	7,400
3	10,000	5,600

Note : The present value of Re. 1 at 15% discount rate for first, second and third year is 0.870; 0.756; 0.658 respectively.

Solution :

(i) Calculation of Present Value

Year	Plant A		P.V. Factor at 15%	Plant B	
	Cashflows	Present Value		Cashflows	Present Value
	Rs.	Rs.		Rs.	Rs.
1	9,500	8,265	.870	6,000	5,220.00
2	11,000	8,316	.756	7,400	5,594.40
3	10,000	6,580	.658	5,600	3,684.80
		23,161			14,499.20

(ii) Present Value Index = $\frac{\text{P.V. of Cash Inflows}}{\text{Initial Investment}}$

$$\text{Plant A} = \frac{\text{Rs.}23,161}{\text{Rs.}20,000} = 1.158$$

$$\text{Plant B} = \frac{\text{Rs.}14,499.2}{\text{Rs.}12,000} = 1.2083$$

4. Discounted Payback Period: This appraisal method takes the basic structure of the payback method, and then deals with one of major disadvantages of that method by discounting the future cash inflows at an appropriate discount rate. Thus, the initial investment is compared with future cash flows given in today's money. The cut off decision rule remains, and it is wholly at the management's discretion to choose three, four or any number of years as the cut-off point.

> *"Discounted pay-back can be defined as, the number of years required to recover the initial investment from the discounted cash flows.*

The discounted cash inflow for each period is then calculated using the formula:

Focus Formula

$$\text{Discounted Cash Inflow} = \frac{\text{Actual Cash Inflow}}{(1+i)^n}$$

where, i = discount rate; and
n = period to which the cash inflow relates.

Sometimes, the above formula may be split into two components which are: actual cash inflow and present value factor i.e. $1 / (1 + i)^n$. Discounted cash flow is then the product of actual cash flow and the present value factor.

The rest of the procedure is like the calculation of simple pay-back period except that we must use the discounted cash flows as calculated above instead of nominal cash flows. Also, the cumulative cash flow is replaced by cumulative discounted cash flow.

Focus Formula

$$Discounted\ Payback\ Period = A + \frac{B}{C}$$

where, A = Last period with a negative discounted cumulative cash flow;
B = Absolute value of discounted cumulative cash flow at the end of the period A; and
C = Discounted cash flow during the period after A.

Illustration : Using the information given below, compute the Pay-back period under Discounted Pay-back Method.

Initial Outlay = Rs. 80,000

Estimated Life = 5 Years

End of The Year	1st	2nd	3rd	4th	5th
Profit after Tax (Rs.)	6,000	14,000	24,000	16,000	Nil

Depreciation has been calculated under straight line method. The cost of capital may be taken at 20% p.a. and P.V. of Re. 1 at 20% is given below :

Year	1	2	3	4	5
P.V. Factor	0.83	0.69	0.58	0.48	0.40

Solution : Calculation of Discounted Pay-back Period

Year	**Profit after Tax**	**Depreciation**	**Cash Inflow at 20%**	**P.V. factor**	**P.V. of Cash**	**Cummulative P.V. of**
	Rs.	Rs.		Rs.	Rs.	Rs.
1	6,000	16,000	22,000	0.83	18,260	18,260
2	14,000	16,000	30,000	0.69	20,700	38,960
3	24,000	16,000	40,000	0.58	23,200	62,160
4	16,000	16,000	32,000	0.48	15,360	77,520
5	NIL	16,000	16,000	0.40	6,400	83,920

The cumulative present value of cash inflows in the 4th year is Rs. 77,520 and in the 5th year it is Rs. 83,920. Hence, the pay-back period falls in between 4th and 5th year.

To be exact the Pay-back period is 4.4 Years $\left(4\ years + \frac{2,480}{6,400}\right)$

Advantages/Benefits :

- It considers the time value of money by deflating the cash flows using cost of capital of the company.
- The concept backing the method is easy to understand.

Limitations/Disadvantages :

- Discounted payback method does not take into account the full life of the project. The overall benefit and profitability of a project cannot be measured under these methods because any cash flows beyond the payback period is ignored.
- It may become a relative measure. In some situations, the discounted payback period of the project may be longer than the maximum desired payback period of the management but other measures like accounting rate of return (ARR) and internal rate of return (IRR) etc. may favor the project.

- The accuracy of the output only depends upon the accuracy of the input provided, like the accuracy of figures of cash flows, the estimation of the timing of cash flows which affects their present values, and the accuracy of the discount rate to be used etc.

Comparison of Capital Budgeting Methods

(i) Comparison of NPV and Profitability Index Method

(i) The NPV is an absolute measure of a project's acceptability, whereas PI is a relative measure.

(ii) As far as the selection of a project is concerned, both the NPV and PI will arrive at the same decision.

(iii) The PI will be greater than I only for that project which has a positive NPV.

(iv) If the PI is a equal to zero then the NPV would also be zero.

(v) A proposal having PI of less than I will also have negative NPI.

(vi) A decision may differ under NPI and PI in case of evaluation of mutually exclusive proposals.

(ii) Comparison of NPV and IRR Method

Similarities

1. NPV and IRR both are the methods of discounted cash flow (DCF) technique of evaluating capital investments.
2. Both considers time value of money.
3. Both the methods lead to the same acceptance or rejection decision rule where there is a single project.

Differences

1. Minimum Required Rate of Return : The main difference between the two methods is that whereas in NPV method, the minimum desired rate of return (cost of capital) is assumed to be known. On the other hand, in case of IRR method this rate is to be determined through trial and error to arrive at the rate at which the present value is zero.

2. Conclusions Differ : In case of two mutually exclusive projects, it is not possible to reach at the same conclusions under both the methods. This may be due to unequal economic life or difference pattern of cash inflows or different size of cash outflow.

3. Assumption of Re-investment : The IRR method implies that cash inflows generated by the project are re-invested at the internal rate of the project which may not be. On the other hand, in NPV method, the cash inflow are invested at the rate of firm's cost of capital which is more convincing.

4. Objective of Rate of Return : The rate of return ascertained under IRR method determines the maximum rate of return or funds raised. On the other hand, the NPV method attempts to find out the amount which can be invested in a particular project so that its projected earnings may be sufficient to repay this amount with interest at the market rate.

5. Basis of Computation of the Rate : In IRR method, the re-investment rate is calculated in conformity with the cash flows from the investment proposals which is never based on cost of capital. On the contrary, in NPV method, the re-investment rate is ascertained on the basis of cost of capital.

Limitations of Capital Budgeting

1. **No Accuracy of Estimates :** As the estimates of profitability of investment proposals relate to some future period which is uncertain, Decision involving uncertainty involve an element of risk.
2. **Comparability of Costs and Benefits :** Capital investment decisions are based on estimates of future costs and benefits of the alternative investment proposals. But as the cost incurred and benefits received from the capital investment proposals occur at different time periods, these are not logically comparable due to the time value of money.
3. **Consideration of Certain Costs and Benefits :** Capital budgeting decisions involve some considerations other than profitability such as employees welfare, prestige of the firm, statutory obligations, etc., which cannot be calculated in quantitative terms.

Capital Rationing

Capital budgeting decision is a simple process in those firms where fund is not the constraint, but in majority of the cases, firms have fixed capital budget, so large number of projects compete for these limited budgets. So, the firm ration them in a manner so as to maximize the long-term returns. Thus, ***capital rationing refers to the situation where the firm have more acceptable investment proposal requiring greater amount of finance then is available with the firm***. It is concerned with the selection of a group of investment out of many investment proposals ranked in the descending order of the rate of return.

Capital rationing situation refers to the choice of investment proposals under financial constraints in terms of a given size of capital expenditure budget. ***The objective is to select the combination of projects which would maximize the total NPV.*** Capital rationing puts a limit on the maximum amount that can be invested during a given period of time such as a year.

Capital rationing may result in accepting several investment proposals then accepting a few large investment proposals so that there may be full utilization of budget ceiling. This may result in accepting relatively less profitable investment proposal if full utilization of budget is a primary consideration. Similarly, capital rationing also requires the firm to forgo the next most profitable investment falling after the budget ceiling even though it is estimated to yield a rate of return higher than the required rate of return.

Ways of Implementing Capital Rationing:

(i) It may be implemented through budgets

(ii) It can be done by putting up a ceiling when it has been financing investment proposal only by way of retained earnings.

(iii) It can also be done by responsibility accounting, whereby management may authorize a department to make investment decisions are to be taken by higher ups.

Ques. *Which of the following is not true with reference to capital budgeting ?*

(NTA UGC-NET June 2015 P-II)

(A) Capital budgeting is related to asset replacement decisions.

(B) Cost of capital is equal to minimum required return.

(C) Existing investment in a project is not treated as sunk cost.

(D) Timing of cash flows is relevant.

Ans. *(C) Existing investment in a project is not treated as sunk cost.*

Ques. *Mutually exclusive projects can be more accurately ranked as per*

(NTA UGC-NET Dec. 2013 P-III)

(A) Internal rate of return method

(B) Net Present Value Method

(C) Modified Internal Rate of Returns Method

(D) Accounting or Average Rate of Return Method

Ans. *(B) Net Present Value Method*

Ques. *Which method does not consider the time value of money ?*

(NTA UGC-NET Dec. 2012 P-II)

(A) Net Present Value *(B) Internal Rate of Return*

(C) Average Rate of Return *(D) Profitability Index*

Ans. *(C) Average Rate of Return*

Ques. *In capital budgeting, the term capital rationing implies :* ***(NTA UGC-NET June 2015 P-II)***

(A) that no retained earnings are available.

(B) that limited funds are available for investment.

(C) that no external funds can be raised.

(D) that no fresh investment is required in current year.

Ans. *(B) that limited funds are available for investment.*